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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/591,432	06/09/2000	Miller Baird McDonald JR.	22727/04060	3078

24024 7590 04/22/2003

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MILLER, RYAN J

ART UNIT	PAPER NUMBER
2621	10

DATE MAILED: 04/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	09/591,432	MCDONALD ET AL.
Examiner	Art Unit	
Ryan J. Miller	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) This action is **FINAL**.                  2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-30 is/are pending in the application.
  - 4a) Of the above claim(s) 26 and 27 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-25 and 28-30 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 09 June 2000 is/are: a) accepted or b) objected to by the Examiner.
 

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.
 

If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
  - a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input checked="" type="checkbox"/> Interview Summary (PTO-413) Paper No(s). <u>9</u> .
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>6 and 7</u> .	6) <input type="checkbox"/> Other: _____

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-25 and 28-30, drawn to an image processing method for determining seed vigor index based on a “primary path”, classified in class 382 (image analysis), subclass 110 (plant inspection).
  - II. Claim 26, drawn to a method of highlighting seed features for display, classified in class 345 (Operator Interface and Display Systems), subclass 629 (Merge or Overlay Graphic Manipulation).
  - III. Claim 27, drawn to a method of germinating seeds, classified in class 47 (Plant Husbandry), subclass 61 (Seed Germinator).

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I, II and III are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, invention II has separate utility such as highlighting features that would indicate if the seedling has a disease or if the roots were experiencing stunted growth due to a fungus and invention III has separate utility such as germinating seeds to compare the characteristics of different seeds or to determine how the seeds react to different factors. See MPEP § 806.05(d).

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3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with John Kalnay on April 17, 2003 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-25 and 28-30. Affirmation of this election must be made by applicant in replying to this Office action. Claims 26 and 27 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention. It was also discussed in the same conversation that claims 28-30 should be dependent upon claim 27 instead of claim 1. The applicant's representative requested that these claims be cancelled by an examiner's amendment. The examiner is only able to make an amendment to cancel claims before allowance. Therefore, the examiner requests that these claims be cancelled in response to this office action.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

*Information Disclosure Statement*

5. The examiner requests a copy of the book "International Seed Testing Association Seed Vigour Testing Handbook" (1987) as cited on page 2, lines 4-5 of the specification. This reference is extremely pertinent to the examination of this application. Full consideration of this prior art is essential.

***Compact Disc Submission***

6. The description portion of this application contains a computer program listing consisting of more than three hundred (300) lines. In accordance with 37 CFR 1.96(c), a computer program listing printout of more than three hundred lines must be submitted as a computer program listing appendix on compact disc conforming to the standards set forth in 37 CFR 1.96(c)(2) and must be appropriately referenced in the specification (see 37 CFR 1.77(b)(4)). Accordingly, applicant is required to cancel the computer program listing appearing at the end of the specification in Listings 1, 2, and 3, file a computer program listing appendix on compact disc in compliance with 37 CFR 1.96(c) and insert an appropriate reference to the newly added computer program listing appendix on compact disc at the beginning of the specification.

***Drawings***

7. Color photographs and color drawings are acceptable only for examination purposes unless a petition filed under 37 CFR 1.84(a)(2) is granted permitting their use as acceptable drawings. In the event that applicant wishes to use the drawings currently on file as acceptable drawings, a petition must be filed for acceptance of the color photographs or color drawings as acceptable drawings. Any such petition must be accompanied by the appropriate fee set forth in 37 CFR 1.17(h), three sets of color drawings or color photographs, as appropriate, and an amendment to the first paragraph of the brief description of the drawings section of the specification which states:

The patent or application file contains at least one drawing executed in color. Copies of this patent or patent application publication with color drawing(s) will be provided by the U.S. Patent and Trademark Office upon request and payment of the necessary fee.

Color photographs will be accepted if the conditions for accepting color drawings have been satisfied.

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8. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "98", "100", and "110" are mentioned in the description of Fig. 4, but are not found in the figure. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

#### *Claim Objections*

9. The following quotations of 37 CFR § 1.75(a) are the basis of objection:

(a) The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

10. Claims 20-22 and 28 are objected to under 37 CFR § 1.75 as failing to particularly point out and distinctly claim the subject matter which the applicant regards as his invention or discovery.

Regarding claims 20-22, the meaning of the limitation "a hypocotyl/radicle separation point" in each of the claims is unclear. Is the applicant referring to "a hypocotyl or radicle separation point" or "a hypocotyl and radicle separation point"? Or does the applicant mean "a separation point between the hypocotyl and the radicle"? The examiner suggests the use of the language "a separation point between the hypocotyl and the radicle"?

Regarding claim 28, the claim recites the limitations "said step of germinating" and "the shallow container" in lines 1 and 2, respectively. There is insufficient antecedent basis for these limitations in the claims. The examiner suggests changing the dependency of this claim from being dependent on claim 1 to being dependent upon claim 27.

***Claim Rejections - 35 USC § 112***

11. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

12. Claims 1-25 and 28-30 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claimed invention describes a method of automatically analyzing “at least one seedling” to determine a seed vigor index from a least the at least one value determined from the primary path of the at least one seedling. Therefore, based on the claim language, this method can determine seed vigor index from the digital image and primary path information of one seed. However, the system, as described in the specification, needs to obtain statistics from a plurality of seedlings in order to determine the seed vigor index. The specification, page 40, lines 12-29, describes the equation for determining the seed vigor index. Such values as sample means of the hypocotyl length and radicle length as well as a variety of standard deviation values are needed. These values cannot be computed from the information obtained from one seedling. The original disclosure does not enable one of ordinary skill in the art to determine a seed vigor index by analyzing only one seed; or for that matter only a few seeds.

This same problem exists in several of the dependent claims. The dependent claims 2-15 and 28-30 are rejected as being dependent upon a rejected claim.

***Claim Rejections - 35 USC § 102***

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claims 1, 3, 5-6, and 29-30 are rejected under 35 U.S.C. 102(b) as being anticipated by McNertney (U.S. Patent No. 5,864,984 A).

As applied to claim 1, McNertney discloses a method of automatically analyzing at least one seedling germinated from at least one seed, comprising the steps of (a) capturing a digital image of the at least one seedling (see column 9, lines 56-57: The reference describes that image capture software is used to obtain an image with the camera.); (b) identifying the at least one seedling in the captured digital image (see column 9, line 66-column 10, line 3: The reference describes that a seed region of interest (ROI), within which a particular seed is located, is determined (i.e. identifying the at least one seedling).); (c) determining a primary path of the at least one seedling (see column 10, lines 1-6: The reference describes that the root growth (i.e. primary path) is followed.); (d) determining at least one value from the primary path of the at least one seedling (see column 11, lines 53-63: The reference describes the accumulation of data (i.e. determining at least one value) regarding root growth (i.e. the primary path) such as the root position and endpoints.); and (e) determining a seed vigor index from at least the at least one value determined from the primary path of the at least one seedling (see column 12, lines 27-34: The reference describes that data analysis software is used to analyze all of the data (i.e. at least the at least one value determined from the primary path) to determine seedlot vigor.).

As applied to claim 3, McNertney discloses (a) that the step of determining at least one value from the primary path of the at least one seedling comprises the step of determining a value corresponding to the length of the radicle of the at least one seedling (see column 10, lines 1-6: The reference describes that the root growth (i.e. radicle) is followed.); and (b) that the step of determining a seed vigor index from at least the at least one value determined from the primary path of the at least one seedling comprises the step of determining a seed vigor index from at least the value corresponding to the length of the radicle of the at least one seedling (see column 12, lines 27-34: The reference describes that data analysis software is used to determine the seedlot vigor from information obtained from the length of the roots (i.e. radicle).).

As applied to claim 5, which is representative of claim 6, McNertney discloses that the step of determining a primary path of the at least one seedling comprises the step of determining a locus of pixels, the locus of pixels corresponding to the primary path of the at least one seedling and the locus of pixels being narrower in width than the width of the at least one seedling in the digital image of the at least one seedling (see column 11, lines 6-15: The reference describes that a region of interest (ROI) is determined around a seed (i.e. determining a locus of pixels) that includes the roots of the seed (i.e. the locus of pixels corresponding to the primary path of the at least one seedling). The reference also describes that entire root structure may grow outside of the ROI. Therefore, the ROI (i.e. locus of pixels) is narrower in width than the width of the seedling.).

As applied to claims 29 and 30, McNertney discloses that the step of capturing a digital image of the at least one seedling comprises capturing an image of the at least one seedling using a scanner having a scanner surface and positioned with its scanner surface substantially inverted

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so that it captures an image of at least one seedling positioned beneath the scanner (see Fig. 1: From this figure it can be seen that the camera 10 (i.e. scanner) is positioned with its lens (i.e. scanner surface) substantially inverted so that it can capture an image of the seedling in germination box 12 positioned beneath the camera 10.).

***Claim Rejections - 35 USC § 103***

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McNertney (U.S. Patent No. 5,864,984 A) and McCormac et al. (the article titled “A modified slant board test for vigour testing brassicas”). The arguments as to the relevance of McNertney in the rejection of claim 1 above are incorporated herein.

Claim 28 calls for germinating the at least one seed with the shallow container at an angle with respect to the vertical that is less than about 10° comprises the step of positioning the shallow container vertically. This step is absent from McNertney, but is clearly disclosed in McCormac et al. (see RESULTS, page 83: The reference describes germinating the seeds in a container at an angle of 90° (i.e. vertically).).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify McNertney by adding the method of germination taught in McCormac et al. because this method reduces the need to straighten the roots before taking measurements, thus leading to more accurate root measurements (see McCormac et al.:

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RESULTS, column 2, page 83). This method would therefore lead to a more accurate calculation of seedlot vigor.

*Conclusion*

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Conrad (U.S. Patent No. 5,659,623 A) is pertinent in that the reference discloses a method and apparatus for assessing the quality of a seed using image processing techniques that determine the surface area of leaf structure.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan J. Miller whose telephone number is (703) 306-4142. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4750.

Ryan J. Miller  
Examiner  
Art Unit 2621

  
Ryan J. Miller  
April 18, 2003

  
BRIAN WERNER  
PRIMARY EXAMINER